

Transit Bus Fleet Rule and Emission Standards for New Urban Buses



July 31, 2001

California Environmental Protection Agency



Air Resources Board

California About Fifty Years Ago....



California Now on a Good Day



Health Effects

OZONE

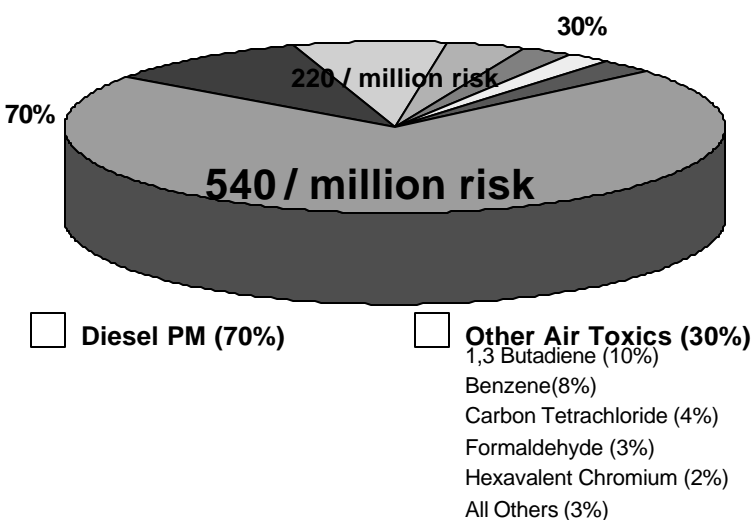
- Coughing, pain with deep breathing
- People with asthma--more attacks, more hospital visits
- Repeated injury and possible permanent lung damage

PARTICULATE MATTER

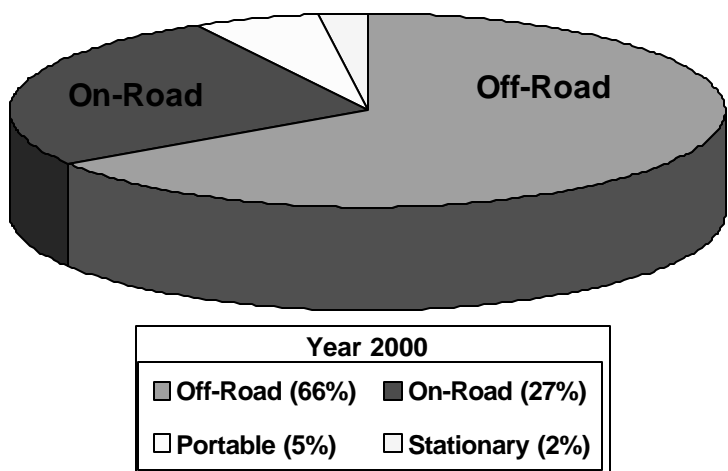
- Increases lung cancer
- Increases asthma attacks
- Aggravates bronchitis
- Contributes to premature death in people with pre-existing respiratory and cardiac problems



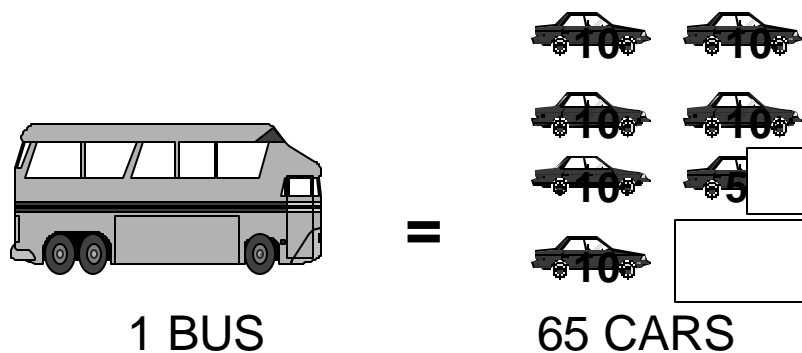
70% of Air Toxic Risk is From Diesels



98% of Diesel PM is Emitted by Mobile Sources



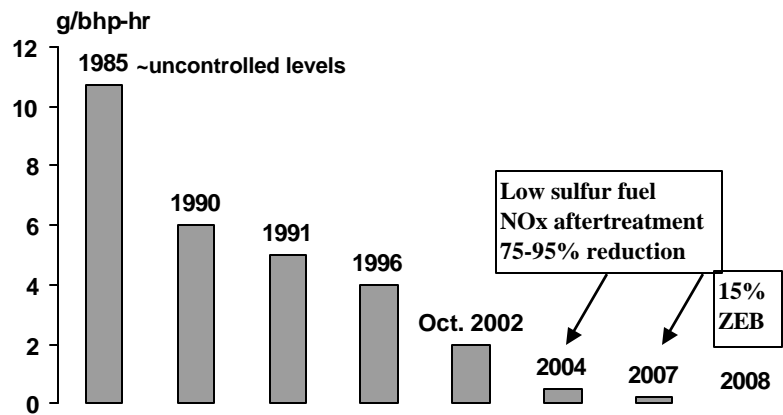
Emissions Comparison Current Transit Bus vs. Passenger Car (NO_x + NMHC)



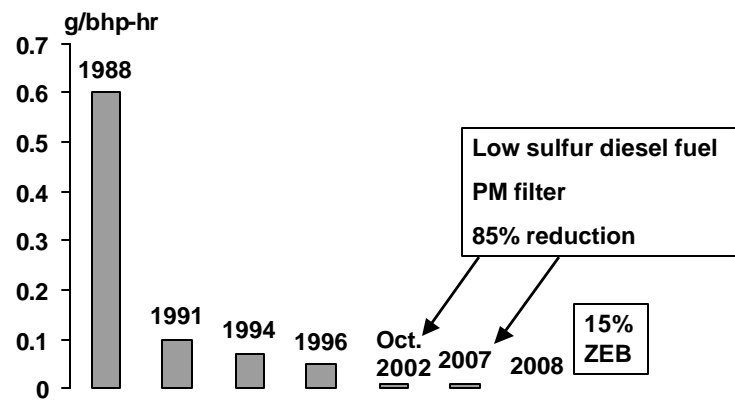
Urban Transit Bus Rule

- Air quality benefits
- Cleaner technology available now
- Cleaner fuels available now
 - alternative fuels
 - low sulfur diesel fuel
- Zero/near zero technology emerging

NOx Emission Standards New Transit Buses



PM Emission Standards New Transit Buses



Advanced Technologies

2007 Standards Can Be Met With:

- NOx Aftertreatment
- PM Filter
- Low Sulfur Diesel Fuel
- Diesel-Water Emulsions
- Engine Modifications - EGR

Advanced Technologies (Cont'd)

2007 Standards Can Be Met With:

- Natural Gas Engines with Aftertreatment
- Other
 - ▶ Hydrogen Fuel Cells
 - ▶ Battery Electric
 - ▶ Advanced Hybrid-Electric
 - ▶ Microturbine

Two-Path Approach

- Two paths: alternative-fuel and diesel
- Two paths provide flexibility to transit operators
- Both paths reduce emissions from new buses and older, in-use fleet
- Both paths lead to zero/near-zero emissions

Alternative-Fuel Path

- 85% of new bus purchases must be alternative fuel (through 2015)
- Immediate reductions in NOx, toxic diesel PM emissions
- Inherently lower in-use PM emissions
- Still eligible for incentive funds

Diesel Fuel Path

- Foregoes immediate NO_x emission reductions until 2004
- Introduces advanced technology first
 - particulate filters (10/02)
 - zero emission bus demonstration (2003)
 - diesel NO_x aftertreatment (2004)

In-Use Fleet Requirements NO_x Fleet Average

- NO_x Fleet Average
 - Applies to all transit agencies
 - 4.8 g/bhp-hr NO_x
 - October 1, 2002
- Compliance Options
 - Based on all buses in the active fleet
 - Apply by 1/31/02 to include ZEBs that are not “urban buses” in calculation

In-Use Fleet Requirements

PM Retrofit

- Retrofit Using ARB-Certified Devices
- Phased-In Schedule By
 - Fuel Path
 - Model Year
- Delayed Implementation for Small Transit Agencies in Federal One-Hour Ozone Attainment Areas

PM Retrofit Schedule

Diesel Path

| Tiers | 2003 | 2004 | 2005 | 2006 | 2007 |
|-----------------------|-------|-------|------|------|-------|
| Tier 1 Pre-1991 | 100 % | | | | |
| Tier 2 1991 - 1995 | 50 % | 100 % | | | |
| Tier 3 1996 - 2002 | | | 20 % | 75 % | 100 % |

Note: Percentages of retrofit requirements must be met by January 1 of each year.

PM Retrofit Schedule

Alternative Fuel Path

| Tiers | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|-----------------------|-------|------|-------|------|------|------|-------|
| Tier 1 Pre-1991 | 100 % | | | | | | |
| Tier 2 1991 - 1995 | 20 % | 75 % | 100 % | | | | |
| Tier 3 1996 - 2002 | | | | | 20 % | 75 % | 100 % |

Note: Percentages of retrofit requirements should be met by January 1 of every year.

In-Use Fleet Requirements

PM Retrofit

- A Certified Retrofit Device Must be Available 6 Months Prior to Implementation Dates
- Currently, There Are No ARB-Certified Retrofit Devices
- Applications have been received

In-Use Fleet Requirements Low-Sulfur Diesel Fuel

- Low-Sulfur Diesel Fuel
 - <15 parts per million (ppm) sulfur
 - July 1, 2002
- Delayed implementation for small transit agencies (<20 buses) in ozone attainment areas

Zero-Emission Bus Demonstration

- EO Certified Urban Bus includes:
Hydrogen-Fuel Cell, Electric Trolley,
Battery-Electric
- Demonstration Required: Diesel Path
with >200 Buses
- Prepare and Solicit Bids by 1/1/02
- Place in Service by 1/1/03
- May Petition for a Joint Demo

Zero-Emission Bus Purchases

- Demonstration Report due 1/31/2005
- ARB Feasibility Review January 2006
- Diesel Path: 15% Purchase/Lease for MY 2008-2015
- Alt. Fuel Path: 15% Purchase/Lease for MY 2010-2015
- Credits for Early Purchase

Reporting Requirements For All Transit Agencies

- Compliance is monitored through reporting
- ARB develops forms and posts on web site
- Ongoing outreach is required

Our Goals: Clean Air



And Healthy Citizens

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For Further Information:

arb.ca.gov/msprog/bus/bus.htm

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